

(This section to be completed by subcontractor requesting document)

Requestor J. Lamb / 1034A Document Center (is requested to provide the following document)

Date of request ~~2/21/96~~ 3/29/96 Expected receipt of document ~~3/21/96~~ 4/30/96

Document number K2-1143 Date of document 8/1947

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 4/8/96

Date submitted to ADC 4/15/96

Date submitted to HSA Coordinator 4/8/96

(This section to be completed by HSA Coordinator)

Date submitted to CICO 00 4/15/96

Date received from CICO 4/19/96

Date submitted to ChemRisk/Shonka and DOE 4/23/96

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received _____

Signature _____

UNCLASSIFIED

2806

This document consists of 10 pages
No. of copies, Series A

Approved for issue by: R. W. Levin
Date of issue: August 19, 1947

Plant Records Department Vault	
Doc. No.	
Serial No.	
File No.	KZ-1143

CARBIDE AND CARBON CHEMICALS CORPORATION

K-25 PLANT

URANIUM CONTROL AND INSPECTION DEPARTMENT

MATERIAL BALANCES FOR "WATER MEDIA" RECOVERY, CARBON RECOVERY,
CONVERSION, OIL RECOVERY, AND DECONTAMINATION PRODUCTION FIGURES
June 30 - July 30, 1947

Frank Mills

DISTRIBUTION LIST

- Cy. 1. Anderson, F. H.
2. de la Garza, A
3. Hartman, W. C.
4. Huber, A. P.
5. Levin, R. W.
6. Loveland, C. W.
7. Preuss, H. M.
8. Sheldon, G. T. E.
9. File

INVENTORIED
NOV 9 1951

31677

-- DECLASSIFIED --

by authority of: JD McGaugh Jr (K-25/LMES)
Classification Specialist

(CG-PGD-4) 4/16/96
(Authorized Declassifier's name and organization)

4/17/96
(date)

(Person making change)

4/17/96
(date)

(Document identification verified by)

~~This document contains information affecting the
National Defense of the United States within the
meaning of the Espionage Act, U.S.C. 56, and
the transmission or the revelation of its
contents in any manner to an unauthorized person
is prohibited by law.~~

UNCLASSIFIED

Classification changed to:

Thomaz W. Selby 4/15/96
ADC or ADD signature (first reviewer) Date
J. B. Gay 4/16/96
Date

Carbide and Carbon Chemicals
Corporation, Operating Contractor for
the U.S. Atomic Energy Commission.

UNCLASSIFIED

This document has been approved for release
to the public by *Thomaz W. Selby*
for *Armin S. Quist* 4/19/96
Technical Information Officer Date
Oak Ridge K-25 Site

AUG 20 1947

K2-1143

~~SECRET~~

INTER-COMPANY CORRESPONDENCE

(Insert
Name) COMPANY Carbide and Carbon Chemicals Corp. LOCATION Post Office Box 2,
Oak Ridge, Tenn.

To: Mr. G. T. E. Sheldon
Location K-303-7

Date August 14, 1947

Answering Letter Date

Attention

Copy To: Attached Distribution

Subject Material Balances for
"Water Media" Recovery,
Oil Recovery, Carbon
Recovery, Conversion,
and Decontamination
Production Table.

Attached please find copies of the material balances for the period June 30, to July 30, 1947 covering "Water Media" Recovery, Oil Recovery, Carbon Recovery, Conversion and Production figures of K-1303 Decontamination.

All laboratory analyses were delivered much quicker this month than last month, hence, we are able to issue the balances by the 15th of the month. Actually, the balances were completed 3 days earlier but were held up for checking the Decontamination Production and analyses of the figures obtained.

The main points of accounting interest are:

- (1) The Decontamination unit shows a negative production for the month
- (2) The Oil Recovery balance shows a 19.6% shortage with the analyses work shifting from the Trouble Shooting Section to Uranium Analysis Section in the Works Laboratory.
- (3) The other units show good to excellent material accounting.

The main points of production interest are:

- (1) The Decontamination unit shows a negative production.
- (2) The approximate recovery efficiency of the "Water Media" Recovery has dropped from 93.0% for the first 6 months to 60.5% for the month of July.
- (3) The Conversion unit showed an efficiency of 87.3% on the batch balances but the feedable T in the TF_6 produced was only about 65.% of the total T charged into the reactors. The approximate year-to-date conversion efficiency is less than 59.% of the T charged into the reactors.

~~SECRET~~

"Water Media" Recovery

The "Water Media" Recovery balance shows a loss of 0.130 KgT or 3.41% of the total T handled. This fluctuation is within the variation due to analyses. The T-assay shown on the balance is very high but this is a calculated assay merely to show the grams of T lost.

The T_2O_3 shipped is only 9.2% of the total handled, while "impure filter cake" contained 10.16% of the total. There was no beginning inventory but the ending inventory of .032 KgT was all filtered feed. If a 90% recovery of this T as T_2O_3 is assumed, a little better picture of the operation may be obtained as follows:

T_2O_3	.936 KgT	or	60.5%	of total
Filtrate and Wash Water	.235 KgT	or	19.5%	" "
Impure Filter Cake	.203 KgT	or	13.1%	" "
Samples	.032 KgT	or	2.1%	" "
Unaccounted for	.042 KgT	or	8.4%	" "

This 60.5% recovery efficiency is far below the first 6 months average of 93.0%. The lowest month of the first 6 months showed an 80% efficiency (this low month had a 29% unaccounted for). The recovery efficiency was anticipated to be lower this month since the unit was operating on weak solutions. This is the first measure of the relative difference in recovery efficiency on different concentrations of solutions. The solutions averaging .17 g/l showed a July efficiency of 60.5% vs 93% efficiency on 1.3 g/l solutions.

K-1301 Conversion

The material balance for the conversion unit shows a gain of only 0.402 KgT or only 0.61% of the total handled. The overall batch balances for the month show a gain of 2.5%. This difference is explained by weight differences and loss due to handling and sampling. (The weight of samples shipped is used in accounting for material but loss while taking the sample is not accounted for in the batch balances.)

The year-to-date figure shows a gain of 4.5 KgT or 2.3% of the total. The overall laboratory bias on T_2O_3 analyses is thought to be about minus 1.5 to 2.5%. There is also some slight gain due to assuming the TF_6 produced is 100% pure. Bearing these points in mind, the material balance shows excellent accounting both for the month and the year-to-date.

From Pure Storage we are informed that 25.64 Kg of TF_6 produced at K-1301 have been shipped to the cascade for feeding and the cascade was unable to feed 6.4 Kg of this TF_6 or 24.9% of the material was unfeedable. This material was produced during July and although incomplete, the figures are a good representation of the July production. When this correction is applied to the production obtained from the batch balance we obtain a feedable production of 18.43 KgT or an efficiency of 65.5% of the T charged into the reactors.

8-14-47

The actual useful TF_6 efficiency is probably even lower than this figure because this Storage received some cylinders from K-1301 with small amounts of TF_6 in them and these cylinders were sent directly to Decontamination without attempting to feed them. Also, it is thought that some HF was in the cylinders and was not deducted from the weight of material charged to the cascade. (Pressure was reported in some of the cylinders at atmospheric temperature and this material was fed to the cascade.) These two facts were not considered in estimating the 65% fluorination "feedable" T efficiency.

The balance shows 58.4% of the total T handled to be shipped as TF_6 . This is not a fair estimation of the production efficiency since some of the T_3O_8 and TU_3 received was shipped out and some TF_6 was received. By adjusting for these, a slightly better approximate year-to-date production efficiency is shown to be 59.6%. By making a more complete breakdown of these figures and adjusting for the weight of material returned to Decontamination in the cylinders, a better actual efficiency might be obtained. It is thought, however, that more accurate production efficiency on the year-to-date will be lower than 59%.

Carbon Recovery

The Carbon Recovery unit has been inactive during the month and the balance is the same as last month.

Oil Recovery

The Oil Recovery balance shows a loss of .691 KgT or 19.6% of the total material handled. The year-to-date figure shows a loss of 3.83 KgT or 22.0% of the total T handled. As pointed out in previous reports this is probably due to the inaccuracy of the better cake analyses and the vaporization of T from the oil during recovery. The above recent figures are probably affected more by the variation in the analyses than by vaporization. The T analyses of these samples have been shifted from the Trouble Shooting Section to Uranium Analysis Section in the Works Laboratory.

Decontamination K-1303

The estimated production table for decontamination for the month of July shows negative production of .597 KgT. If we subtract the negative production from the amount of T the unit was charged with in cylinders, an actual recovery of 3.837 KgT is shown. In addition to the cylinders, the unit decontaminated about 4,000 pieces of contaminated equipment.

This is partly explained by the fact that some cylinders with T in them were on hand at inventory time and were not shown on inventory. No accurate figure can be obtained for the amount of T in these cylinders at this time, but it was estimated with the Decontamination unit supervisor that about .927 Kg of TF_6 or .627 KgT charged against the unit was on hand at inventory time. Even if this is considered a production of only .03 to 4.7 Kg of T is obtained for decontaminating some 4,000 pieces of equipment.

There are at least three possibilities which would cause the figures to show a negative production. They are as follows:

1. The inventory and shipment analyses are not sufficiently accurate. This is borne out by the large variance figure attached to the production figure. This point is also borne out by the analyses made in S. D. Schneider's laboratory of tanks "A" and "B" on the 25th. These showed 6.18 g/l and 8.55 g/l Vs 5.86 g/l and 5.91 g/l on the July 30th inventory. Furthermore, the inventory analyses report showed a larger analysis on tank "B" last month than this month and the tank has not been emptied during the month.
2. The decontamination tanks may have material settling out and crusting tightly on the bottom of the tanks. If this is happening, material could be caught in the sample to day and not be caught in the sample at a later date. There is considerable evidence that this did happen to "Laboratory Waste" when it was neutralized. Laboratory Waste is not an identical type of material but it is somewhat similar. If this is happening, a special hazard problem is involved in addition to material accounting.
3. The material charged to the unit might contain UF_4 which is not recovered or the weights are in error. If the cylinders contained UF_4 the ammonium carbonate solution used in decontaminating would probably not remove it and the material would be shipped out in the cylinders. I know of no weight checks made on the cylinders after decontaminating them. Such a weight check would detect possible original errors in the tare weights of the cylinders.

URANIUM CONTROL AND INSPECTION DEPT.

Frank Mills
Frank Mills
Accountability Section

Approved:

R. W. Levin
R. W. Levin

FM/ga

Enclosure

MATERIAL BALANCE FOR WATER METER RECOVERY
July 1947

Name of Material	July 1947					Year-to-Date 1947				
	Quantity	Kg. T	% Total T	Weighted Av. X Assay	% Total X	Quantity	Kg. T	% Total T	Weighted Av. X Assay	% Total X
Inventory 6-30-47			-	-	-			* 73.46	* 33577227	25.02
T ₃ O ₈ Received	-	-	-	-	-		1.833	.87	1206734	2.75
Water Solutions Rec'd	8949. L	1.546	100.00	2444282	100.00	49,927. L	53.882	25.87	1209845	72.23
Total to Account For		1.546	100.00	2444282	100.00		209.877	100.00	3341202	100.00
Inventory 7-30-47		.882	57.05	3577423	62.95		.882	.42	3577423	4.9
T ₃ O ₈ Shipped	507. g	.142	9.18	1193616	97	325,273. g	214.514	102.21	1207322	62.1
Filtrate and Wash Shipped	714. L	.157	10.16	2320089	1.36	26,317. L	4.418	2.10	2301367	3.1
Impure Filter Cake	16,874. g	.203	13.13	4541634	5.95	229,298. g	2.988	1.42	3406305	4.1
Samples Shipped		.032	2.07	1200006	.56		5.239	2.50	1205594	7
Other Material Shipped		-	-	-	-		-	-	-	-
Total Accounted For		1.416	91.59	2405323	71.59		229.041	108.65	4500118	102
Total Unaccounted For		4.130	42.41	160795	42.41		18.162	8.65	6877497	16.2
Limit of Error Allotted										

* 12-31-46 Inventory

~~SECRET~~

MATERIAL BALANCE FOR COMBUSTIONATED OIL RECOVERY

July 1947

Name of Material	July 1947				Year-to-Date 1947				
	Quantity (Kg.)	KgT	% Total	Weighted Average X Assay	% Total	Quantity (Kg.)	KgT	% Total	Weighted Average X Assay
Inventory 6-30-47		2,394	47.29	5548434	37.39		*5,831	*32.90	*1204409
C-2144 Received		.225	4.45	117004	4.19		.268	1.51	2249662
MFL Received	282.502	2.443	48.26	2252504	58.42	1265.710	8.740	49.31	6660495
MFL Filter Cake Rec'd		-	-						
Total to Account For		5.062	100.00	5620651	100.00		17.724	100.00	2232562
Inventory 7-30-47		.885	17.43	3358795	14.42		.885	4.99	2248794
Oil Filter Cake Shipped	61.372	3.007	60.98	4428162	46.68	367.462	8.741	49.32	6661205
C-2144 Shipped		-	-	-	-	90.040	3.914	22.08	3356315
Samples Shipped		.099	1.96	3399059	1.67		.305	1.72	6678567
Other Material Shipped		-	-	-	-		-	-	-
Total Accounted For		4.071	80.42	1168326	62.77		13.845	78.11	4479617
Unaccounted For		.991	19.58	2230324	37.23		43.879	21.89	1203116

* 12-31-46 Inventory

MATERIAL BALANCE FOR CARBON RECOVERY (K-1303)

July 1947

Name of Material	July 1947				5-29-47 To Date			
	Quantity (Kg)	Kg Kg	% Total T	Weighted Av. X Assay	% Total X	Quantity (Kg)	Kg Kg	% Total T
Inventory 6-30-47		116.861	100.00	6679857	100.00			
Carbon Received						456.957	116.861	100.00
Total to Account For		116.861	100.00	6679857	100.00		116.861	100.00
Inventory 7-30-47		116.861	100.00	6679857	100.00		116.861	100.00
Total Accounted For		116.861	100.00	6679857	100.00		116.861	100.00
Total Unaccounted For								
Limit of Error Allotted								

* 5-29-47 Inventory

MATERIAL BALANCE FOR CONVERSION (K-1301)

July 1947

Name of Material	July 1947				Year -To-Date 1947					
	Quantity	KgT	% Total T	Weighted Avg. X Assay	% Total X	Quantity	KgT	% Total T	Weighted Avg. X Assay	% Total X
Inventory 6-30-47		8.642	13.21	1202716	4.27		*14.835	*7.58	*1200537	*3.58
TF6 Received		5.893	9.01	2406678	8.63		5.893	3.01	2406678	5.90
Uranate Ash Rec'd		-	-	-	-	158.848g	61.059	31.20	8843333	6.69
C-1523-Y Rec'd		19.166	29.31	1402781	64.86		19.166	9.80	1402781	44.38
T308 Received		30.604	46.80	2302085	19.42		89.609	45.80	1188235	27.10
Other Material Rec'd		-	-	-	-	13.602g	4.014	2.05	1466736	9.74
TF4 Received		1.090	1.67	2503280	3.82		1.090	.56	2503280	2.61
Total to Account		65.395	100.00	1302307	100.00		195.666	100.00	1204624	100.00
Total For										
Inventory 7-30-47		17.064	26.09	2262955	2.55		17.064	8.72	2262955	1.75
C-1535-Y Shipped		11.435	17.49	1402751	88.70		11.435	5.84	1402751	28.48
TF6 Shipped		27.611	42.22	1250635	32.13		102.762	52.53	1215266	44.92
C-1523-Y Shipped		7.884	12.02	1403111	26.64		7.884	4.02	1403111	18.23
Ash Shipped		.711	1.09	2261962	.34		44.723	22.87	1200908	7.39
Agastho Soln. Shipped		-	-	-	-	2000.L	.087	.04	6751611	.10
T308 Shipped		.201	.31	1161695	.03		.201	.10	1161695	.03
Samples Shipped Y-12 (Material)		.628	.96	1402611	2.12		.628	.32	1402611	1.45
Samples Shipped K-25 (Material)		.267	.41	2406678	.00		1.125	.57	1207706	.03
Other Material Shipped		.016	.02	1243507	.01		14.292	7.30	1807807	.03
Total Accounted For		65.797	100.61	3305337	102.92		200.181	102.51	2388754	105.66
Unaccounted For		-.402	-.61	1808868	-2.02		-4.515	-2.51	3500534	-6.75
Limit of Error										
Allotted										

DECONTAMINATION
ESTIMATED PRODUCTION - July 1937

	Net Wt (g) Volume (L)	KgT	Var. T Kg ²	Var. X (Gms. ²)	Weighted Average X Assay
Inventory 7-30-47	12167. (L)	23.151	1.24	2.70×10^2	2238792
Transfers to Cont. Storage	6270. "	2.063	.01	3.30×10^2	1281922
Samples to Laboratories	56. "	.109	.00	$.00 \times 10^2$	3571388
Total	18493. (L)	25.323	1.25	6.00×10^2	6860352
Less: Receipts from Pure Storage - TF_6	6479. (g)	4.380	.00	$.00 \times 10^2$	3333008
Receipts from Pure Storage - Oxide	65. "	.054	.00	$.00 \times 10^2$	3428157
Inventory 6-30-47	12222. (L)	21.486	4.30	11.46×10^2	2247212
Total		25.820	4.30	11.46×10^2	1200897
General Production - July 1947		.597	5.55	17.46×10^2	2315347
		(± 4.72 KgT) (± 88.6 Gms X)			

CUMULATIVE PRODUCTION - 1947 To-Date

Inventory 7-30-47	12167. (L)	23.151	$.01 \times 10^2$	2.70×10^2	2238792
Transfers to Cont. Storage	34800. "	133.425	2.09×10^2	233.70×10^2	2249763
Samples to Laboratories		.487	$.00 \times 10^2$	$.00 \times 10^2$	3313578
Total		157.063	2.10×10^2	236.40×10^2	4498668
Less: Receipts from Pur Pure Storage - TF_6	15279. (g)	10.330	$.00 \times 10^2$	$.00 \times 10^2$	6634351
Receipts from Pure Storage - Oxide	65. "	.054	$.00 \times 10^2$	$.00 \times 10^2$	3428157
Inventory 12-31-46	11739. (L)	27.179	$.13 \times 10^2$	5.59×10^2	4456585
Totals		37.563	$.13 \times 10^2$	5.59×10^2	7721541
General Production, 1947 To-Date		119.500	2.23×10^2	241.99×10^2	2222220
		(± 29.86 KgT) (± 311.1 gms X)			